

WHAT IS CLAIMED IS:

1. A method comprising:

measuring a battery terminal voltage of a battery of an implantable medical device;

measuring a charge delivered by the battery during a first time period after the device has been implanted and before the battery terminal voltage falls below a first voltage threshold, wherein the first voltage threshold is a function of a rate at which the charge is delivered by the battery;

calculating an available or depleted battery charge using the measured charge delivered by the battery during the first time period;

communicating to a user an indication of the available or depleted battery charge; and

communicating to the user an indication of whether the battery terminal voltage has fallen below the first voltage threshold.

2. The method of claim 1, in which the measuring the charge delivered by the battery comprises measuring a current delivered by the battery.

3. The method of claim 2, further comprising:

comparing the measured current delivered by the battery to a current threshold;

declaring a current fault if the measured current delivered by the battery exceeds the current threshold; and

communicating to the user an indication of whether the current fault has been declared.

4. The method of claim 3, further comprising:

checking a shipping state storage location to determine whether the implantable device is in a shipping state or is instead in an implanted state; and

establishing a value of the current threshold using whether the implantable device is in the shipping state or is instead in the implanted state.

5. The method of claim 2, in which the measuring the current delivered by the battery includes averaging the measured current.

6. The method of claim 5, in which the averaging the measured current includes averaging over a second time period of about one day.

7. The method of claim 5, further comprising:

comparing, to a current threshold, the average measured current delivered by the battery;

declaring a current fault if the average measured current delivered by the battery exceeds the current threshold; and

communicating to the user an indication of whether the current fault has been declared.

8. The method of claim 7, further comprising:

checking a shipping state storage location to determine whether the implantable device is in a shipping state or is instead in an implanted state; and

establishing a value of the current threshold using whether the implantable device is in the shipping state or is instead in the implanted state.

9. The method of claim 2, in which the measuring the current delivered by the battery includes averaging the measured current.

10. The method of claim 9, in which the averaging the measured current includes averaging over a second time period of about one week.

11. The method of claim 9, further comprising:

comparing, to a current threshold, the average measured current delivered by the battery; and

establishing a value of the first voltage threshold using a result of the comparing the average measured current delivered by the battery.

12. The method of claim 1, further comprising:

measuring a temperature of the implantable medical device;

comparing the measured temperature to a temperature threshold; and

discounting the measured battery voltage if the measured temperature is below the temperature threshold.

13. The method of claim 1, further comprising:

detecting whether the battery terminal voltage has fallen below a second voltage threshold, wherein the second voltage threshold is lower than the first voltage threshold, and wherein the second voltage threshold is a function of the rate at which a rate the charge is delivered by the battery;

communicating to the user an indication of whether the battery terminal voltage has fallen below the second voltage threshold; and

altering functionality of the implantable medical device if the battery terminal voltage has fallen below the second voltage threshold.

14. A computer-readable medium including computer-executable instructions for performing a method comprising:

measuring a battery terminal voltage of a battery of an implantable medical device;

measuring a charge delivered by the battery during a first time period after the device has been implanted and before the battery terminal voltage falls below a first voltage threshold, wherein the first voltage threshold is a function of a rate at which the charge is delivered by the battery;

calculating an available or depleted battery charge using the measured charge delivered by the battery during the first time period;

communicating to a user an indication of the available or depleted battery charge; and

communicating to the user an indication of whether the battery terminal voltage has fallen below the first voltage threshold.

**15. A system comprising:**

an implantable medical device, the implantable medical device comprising:

- a battery;
- a battery terminal voltage measurement circuit, coupled to the battery, to measure a battery terminal voltage;
- a battery charge delivery measurement circuit, coupled to the battery, to monitor a charge delivered by the battery;
- a controller circuit, coupled to the battery terminal voltage measurement circuit to receive information about the measured battery terminal voltage, the controller circuit also coupled to the battery charge delivery measurement circuit to receive information about a rate at which charge is delivered from the battery, the controller circuit operative to compare the measured battery terminal voltage to a first voltage threshold, the controller circuit operative to compute the first voltage threshold using the information about the rate at which charge is delivered from the battery, the controller circuit operative to calculate an available or depleted battery charge using the measured charge delivered by the battery during a first time period after the device has been implanted and before the battery terminal voltage falls below the first voltage threshold; and
- a communication circuit, coupled to the controller, to communicate from the implantable device an indication of the available or depleted battery charge and an indication of whether the battery terminal voltage has fallen below the first voltage threshold.

16. The system of claim 15, in which the battery charge delivery measurement circuit includes a battery current measurement circuit to provide an indication of the battery current to the controller.
17. The system of claim 16, in which the controller includes a first memory storage location to store a current threshold, and the controller is operative to declare a current fault if the battery current exceeds the current threshold, and the communication circuit is operative to communicate an indication of the current fault from the implantable device.
18. The system of claim 17, further in which the controller includes a second memory storage location to store shipping state information indicative of whether the implantable device is in a shipping state, and in which the controller is operative to establish a value of the current threshold stored in the first memory storage location using whether the implantable device is in the shipping state.
19. The system of claim 16, in which at least one of the battery current measurement circuit and the controller includes an averaging circuit to average the measured current over an averaging time period.
20. The system of claim 15, in which the device further comprises:
  - a temperature sensor to measure a temperature of the implantable medical device;
  - wherein the controller is coupled to the temperature sensor to receive the measured temperature, and in which the controller includes a third memory storage location to store a temperature threshold, and in which the controller is operative to compare the measured temperature to the temperature threshold and to discount the battery voltage measurement if the temperature is below the temperature threshold.

21. The system of claim 15, further comprising:

a user interface, including a user interface communication circuit to communicate with the communication circuit of the implantable device, the user interface further including a display, the display including a displayed meter indicative of battery charge status of the battery in the implantable device, the display further including an indication of whether the measured battery voltage is below the first voltage threshold.

22. The system of claim 15, in which the controller includes a fourth memory storage location to store a second voltage threshold that is lower than the first voltage threshold, and wherein the controller circuit is operative to compare the measured battery terminal voltage to the second voltage threshold, and the controller circuit is operative to compute the second voltage threshold using the information about the rate at which charge is delivered from the battery, and the controller circuit is operative to alter functionality of the implantable device if the measured battery terminal voltage falls below the second voltage threshold, and in which the communication circuit is operative to communicate from the implantable device an indication of whether the battery terminal voltage has fallen below the second voltage threshold.

23. A system comprising:

an implantable medical device, the implantable medical device comprising:

a battery;

a battery terminal voltage measurement circuit, coupled to the battery, to measure a battery terminal voltage;

a battery charge delivery measurement circuit, coupled to the battery, to monitor a charge delivered by the battery;

means, coupled to the battery terminal voltage measurement circuit and the battery charge delivery measurement circuit, for comparing the measured battery terminal voltage to a first voltage threshold;

means, coupled to the battery charge delivery measurement circuit, for calculating an available or depleted battery charge using the measured charge delivered by the battery during a first time period after the device has been implanted and before the battery terminal voltage falls below the first voltage threshold; and

a communication circuit, coupled to the controller, to communicate from the implantable device an indication of the available or depleted battery charge and an indication of whether the battery terminal voltage has fallen below the first voltage threshold.